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**CONNECTING APPARATUS FOR USE BETWEEN A BASE AND A TREATMENT  
UNIT OF A DENTAL INSTRUMENT ASSEMBLY ~~DENTAL TREATMENT~~  
APPARATUS**

RELATED U.S. APPLICATIONS

\_\_\_\_\_  
Not applicable:

\_\_\_\_\_  
STATEMENT REGARDING FEDERALLY SPONSORED  
RESEARCH OR DEVELOPMENT

\_\_\_\_\_  
Not applicable:

\_\_\_\_\_  
REFERENCE TO MICROFICHE APPENDIX

\_\_\_\_\_  
Not applicable:

\_\_\_\_\_  
FIELD OF THE INVENTION

CROSS-REFERENCE TO RELATED U.S. APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED  
RESEARCH OR DEVELOPMENT

Not applicable.

NAMES OF PARTIES TO A JOINT RESEARCH AGREEMENT

Not applicable.

REFERENCE TO AN APPENDIX SUBMITTED ON COMPACT DISC

Not applicable.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The invention relates to an apparatus for dental treatment, comprising a base and a treatment

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unit, which treatment unit comprises one or more treatment instruments and one or more lines for the supply of water, air and electricity: to an dental treatment apparatus. More particularly, the present invention relates to dental treatment apparatus having a base and a treatment unit in which the treatment unit includes several treatment instruments and several lines for the supply of water, air and electricity.

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## BACKGROUND OF THE INVENTION

### 2. Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 37 CFR 1.98.

[0002] Such an apparatus is known:-

[0003] ~~The known apparatus has the drawback, that when this has to be serviced or when, as a result of a malfunction, repairs have to be carried out, the entire apparatus is out of use until the activities are completed:-~~

[0004] ~~It is an object of the present invention to obviate this drawback.~~ Dental treatment apparatus having a base and a treatment unit in which the treatment unit has several treatment instruments and several lines for the supply of water, air and electricity is known in the art. However, the dental treatment apparatus of the prior art has a particular drawback. In particular, when the dental treatment apparatus must be serviced or when, as a result of a malfunction, repairs must be made, the entire apparatus is out of use until the repair or servicing activities are completed.

[0005] It is an object of the present invention to overcome this drawback of the prior art dental treatment apparatus.

## BRIEF SUMMARY OF THE INVENTION

[0006] ~~The apparatus according to the invention to that end is characterized in that in between the~~

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base and the treatment unit a connecting piece is provided by means of which the treatment unit can be disconnected from and connected to the base.

[0007] With the apparatus according to the invention, it is possible to incorporate the technical part of a dental treatment apparatus in a treatment unit and to disconnect this treatment unit from the base. Because of this possibility of disconnection it is possible to provide all the technical parts, and as such, all the parts that are susceptible to malfunction, in a part that is interchangeable.

[0008] According to a further characteristic of the apparatus according to the invention the connecting piece is formed by a first part and a second part which are provided with cooperating connector parts for the supply of water, air and electricity. When the two parts are coupled to each other, the connector parts are connected to each other, in such a way that the lead-through of water, air and electricity from the base to the treatment unit is established. The second part is provided with an opening through which a drawing pen is movable, while the drawing pen at one outer end is fixed to a cable and at the other outer end is provided with an inner flanged edge and, spaced there from, an outer flanged edge. In between the inner flanged edge and the second part, a spring is provided, by which the drawing pen is supported on the second part and by means of which the drawing pen can be drawn against spring force through the opening by the cable, while the first part is provided with a first opening having a diameter such that this can be moved over the outer flanged edge, while the first opening extends into a second opening, having a diameter which is smaller than the diameter of the outer flanged edge but which is larger than the diameter of the drawing pen. When the first part with the second opening is placed in between the flanged edges and leans against the outer flanged edge, by pulling the cable, the first part is moved towards the second part, in such a way, that the

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connector parts are coupled to each other.

[0009] According to a further characteristic of the apparatus according to the invention, the second part is provided with a sleeve in which the drawing pen is movable, while the spring is supported on the second part by means of the sleeve.

[0010] According to another characteristic of the apparatus according to the invention, the one part is provided with at least two guide pins and the other part is provided with at least two guide holes for receiving the guide pins, in such a way that the first part and the second part can be connected to each other in a fixed position. The present invention utilizes a connecting apparatus between the base and the treatment unit. This connecting apparatus allows the treatment unit to be disconnected from and connected to the base. Through the use of the apparatus of the present invention, it is possible to incorporate the components of the dental treatment apparatus and to disconnect the treatment apparatus from the base. The connecting apparatus allows these parts to be interchangeable so as to facilitate service and repair.

[0011] The connecting apparatus of the present invention is formed by first part and a second part that are provided with cooperating connector ports for the supply of water, air and electricity. When the first part and the second part are coupled to each other, the connector ports are connected to each other in such a way that the water lines, air lines and electricity lines from the base to the treatment unit are established. The second part is provided with an opening through which a translatable pin is movable. The translatable pin has an outer end that is fixed to a cable. The translatable pin has an inner flanged member and an outer flanged member at the opposite end from the cable. The inner flanged member is spaced from the outer flanged member in generally parallel relationship. A spring

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extends between the inner flanged member and a surface of the second part. In this manner, the translatable pin is supported on the second part and allows the translatable pin to be drawn against spring force through the opening in the second part by the cable.

[0012] The first part is provided with a first opening having a diameter that is greater than the diameter of the outer flanged member. A key slot opens to this first opening. The key slot has a diameter that is smaller than the diameter of the outer flanged member but is larger than the diameter of the translatable pin. As such, when the first part is placed into a proper position, the key slot is placed between the outer flanged member and the inner flanged member and leans against the outer flanged member. When the cable is pulled, the first part is moved towards the second part in such a way that the connector ports are coupled together.

[0013] The second part is provided with a sleeve in which the translatable pin is movable. The spring is supported on the second part by this sleeve.

[0014] One of the first and seconds is provided with at least two guide pins and the other of the first and second part is provided with at least two guide holes for receiving the guide pins. In this manner, the first part can be connected to the second part in a fixed orientation.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0015] Further features and characteristics will be described with reference to the drawings of an example of an embodiment.

[0016] The figures 1, 2, 3a and 3b show the two cooperating parts of a connecting piece such as can be used in the apparatus according to the invention.

[0017] Figure 1 shows is a perspective view of showing the second part.

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[0018] Figure 2 shows is a perspective view of the first part.

[0019] Figure 3a shows a side view of the second part.

[0020] Figure 3b shows a side view of the first part.

#### DETAILED DESCRIPTION OF THE INVENTION

[0021] As can be seen in the Figures 1 to 3b, the connecting piece, such as can be used in the apparatus for dental treatment according to the invention, is formed by a first part 1 and a second part 2 which are provided with cooperating connector parts 4,9 for the supply of water and air. Furthermore, the parts are provided with connector parts 5,10 for the supply of electricity. When the two parts 1,2 are coupled to each other the connector parts 4,9 and the connector parts 5,10 are connected to each other. In the example of an embodiment shown, the first part 1 is provided with three male connector parts 4 for the supply of water and air, and the second part 2 is provided with three female connector parts 9 for the supply of water and air.

[0022] When the connector parts 4 are connected to the connector parts 9 and when the connector part 5 is connected to the connector part 10, the lead-through of water, air and electricity from the base to the treatment unit is established. When disconnecting the connections between the connector parts 4,9 the couplings for the water and air supply are automatically closed. Because of this, no "leak water" and "leak air" can develop. As can be seen in the figures, the electronics are led through the upper connector parts 5,10. Because of this, in case of any "post dripping" after the disconnection of the coupling, no short-circuiting can come about.

[0023] The second part 2 is provided with a central opening 13 through which a drawing pen 7 is movable. The drawing pen 7 at one outer end 14 is fixed to a cable (not shown) and at the other outer

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end is provided with an inner flanged edge 15 and, spaced there from, an outer flanged edge 16. In between the inner flanged edge 15 and the second part 2, a spring 8 is provided, by which the drawing pen 7 is supported on the second part 2 and by means of which the drawing pen 7 can be drawn against spring force through the opening 13 by the cable. The first part 1 is provided with a central first opening 3 having a diameter such that this can be moved over the outer flanged edge 16, while the first opening 3 extends into a second opening 17, having a diameter which is smaller than the diameter of the outer flanged edge 16 but which is larger than the diameter of the drawing pen 7.

**[0024]** When the first part 1 with the second opening 17 is placed in between the flanged edges 15, 16 and leans against the outer flanged edge 16, by pulling the cable, the first part 1 is moved towards the second part 2, in such a way, that the connector parts 4, 9 and 5, 10 are coupled to each other.

**[0025]** In the embodiment shown, the second part 2 is provided with a guide sleeve 12 in which the drawing pen 7 is movable, while the spring 8 is supported on the second part 2 by means of the sleeve 12.

**[0026]** Furthermore, the second part 2 is provided with at least two conical guide pens 11, and the first part 1 is provided with at least two guide holes 6 for receiving the guide pens 11. In the example of an embodiment shown, the guide pens 11 have a length such that the outer ends 19 thereof extend beyond the inner flanged edge 15 of the drawing pen 7 when the drawing pen 7 is pushed out by the spring 8 that is supported by the second part 2. Further guide slots 18 extend into the guide holes 6 for receiving the outer ends 19 of the guide pens 11 in such a way that, when the parts 1, 2 are being connected to each other and when the drawing pen 7 is being moved from the first opening 3 into the second opening 17, the outer ends 19 of the guide pens 11 are forced by means of the guide slots 18

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into the guide holes 6.

[0027] Because of this, the female and male connectors for the supply of water, air and electricity will gradually couple with each other. Furthermore, the first part and the second part can be connected to each other in a fixed position.

[0028] In an advantageous manner, the space between the inner flanged edge 15 and the outer flanged edge 16 of the drawing pen 7 is only somewhat larger than the thickness of the first part 1, such that the first part 1 fits closely therein between. In this manner, the displacement or tilting of the second part 2 relative to the first part 1 is prevented. Furthermore, in the example of the embodiment, the diameter of the inner flanged edge 15 is larger than the diameter of the first opening 3 in the first part, so that it is prevented that, during the coupling, the first part is pushed over the inner flanged edge 15.

[0029] With the invention, it is possible to incorporate the technical part of a dental treatment apparatus in a treatment unit and to disconnect this treatment unit from the base.

[0030] Because of this possibility of disconnecting, it is possible to mount all the technical parts, more in particular, the parts that are susceptible to malfunction, in an interchangeable part. When the cable releases the drawing pen 7, the first part 1 will be pushed away from the second part 2 by the force of the pressure spring 8 and by the springs in the water and air connectors 4,9. The water and air connections automatically are closed after the opening of the coupling.

[0031] By the three types of connectors that are used, it is possible to mount all the electronics in the treatment unit. Because of this, it is very simple to interchange only the treatment unit in the case of a breakdown. As can be seen in the FIGURES 1 through 3b, the connecting apparatus of the present



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invention is formed by a first part 1 and a second part 2 having connector ports 4 and 9 for the supply of water and air. The first part 1 and the second part 2 are further provided with connector ports 5 and 10 for the supply of electricity. When the first part 1 and the second part 2 are coupled to each other, the connector ports 4 and 9 and the connector ports 5 and 10 are connected to each other. In the preferred embodiment of the present invention, the first part 1 is provided with three male connector ports 4 for the supply of water and air. The second part 2 is provided with three female connector ports 9 for the supply of water and air. When the connector ports 4 are connected to the connector ports 9 and when the connector port 5 is connected to the connector port 10, the lead-through of water, air and electricity from the base to the treatment unit is established. When disconnecting the connections between the connector ports 4 and 9, the couplings for the water and air supply are automatically closed. As a result, no "leak water" and "leak air" develops. As can be seen in the figures, the electronics are passed through the upper connector ports 5 and 10. As a result of this, any "post dripping" after the disconnection of the water connector ports will cause no short-circuiting to occur.

[0032] The second part 2 is provided with a central opening 13 through which a translatable pin 7 is movable. The translatable pin 7 at one outer end 14 is fixed to a cable. The opposite end is provided with an inner flanged member 15 and an outer flanged member 16. The inner flanged member 15 is in spaced parallel relationship to the outer flanged member 16. A spring is positioned between the inner flanged member 15 and surface of the second part 2. As a result, translatable pin 7 is supported on the second part 2. In this manner, the translatable pin 7 can be drawn against spring force through the opening 13 by the cable.

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[0033] The first part 1 is provided with a central first opening 3 having a diameter such that this can be moved over the outer flanged member 16. The first opening 3 extends into a key slot 17. The key slot 17 has a diameter which is smaller than the diameter of the outer flanged member 16 but is larger than the diameter of the translatable pin 7. When the first part 1 with the key slot 17 is placed in between the inner flanged member 15 and the outer flanged member 16 and leans against the outer flanged member 16, the pulling of the cable causes the first part 1 to be moved toward the second part 2. In this manner, the connector ports 4 and 9 and the connector ports 5 and 10 are coupled to each other.

[0034] In the illustrated embodiment of the present invention, the second part 2 is provided with a guide sleeve 12 in which the translatable pin 7 is movable. The spring 8 is supported on the second part 2 by means of the sleeve 12.

[0035] The second part 2 is provided with at least two conical-shaped guide pins 11. The first part 1 is provided with at least two guide holes 6 for receiving the guide pins 11. The guide pins 11 have a length such that the outer ends 19 thereof extend beyond the inner flanged member 15 of the translatable pin 7 when the translatable pin 7 is pushed out by the spring 8. Additionally, the guide slots 18 extend into the guide holes 6 for receiving the outer ends 19 of the guide pins 11. In this manner, when the parts 1 and 2 are connected to each other and when the translatable pin 7 is moved from the first opening 3 into the key slot 17, the outer ends 19 of the guide pins 11 are forced by means of the guide slots 18 into the guide holes 6.

[0036] Through the construction of the present invention, the female and male connectors for the supply of water, air and electricity will gradually couple with each other. The first part and the

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second part can be connected to each other in a fixed position. The space between the inner flanged member 15 and the outer flanged member 16 of the translatable pin 7 is only somewhat larger than the thickness of the first part 1. As such, the first part 1 will fit closely therebetween. In this manner, the displacement or tilting of the second part 2 relative to the first part 1 is prevented. The diameter of the inner flanged member 15 is larger than the diameter of the first opening 3 so as to prevented the first part to be pushed over the inner flanged member 15 during the coupling of the first part 1 to the second part 2.

[0037] By virtue of the present invention, it is impossible to incorporate the technical portions fo the dental treatment apparatus in a treatment unit and to disconnect this treatment unit from the base. As such, it is possible to mount all of the technical parts, in particular those parts that are susceptible to malfunction, as part of an interchangeable unit. When the cable releases the translatable pin 7, the first part 1 will be pushed away from the second part 2 by the force of the pressure spring 8 and by the springs in the water and air connectors 4 and 9. The water and air connections automatically are closed after the opening of the coupling.

[0038] Through the use of these three types of connectors, it is possible to mount all the electronics in the treatment unit. Because of this, it is very simple to interchange the treatment unit in the case of a malfunction or breakdown.

[0039] The foregoing disclosure and description of the invention is illustrative and explanatory thereof. Various changes in the details of the illustrated construction can be made within the scope of the appended claims without departing from the true spirit of the invention. The present invention should only be limited by the following claims and their legal equivalents.